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* ARTIFICIAL INTELLIGENCE IN INFORMATION SERVICES: REVOLUTION OR SURVIVAL?

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The evolution of society places a growing demand on access to information. Libraries have been pivotal in shaping society by providing this access, but now that role has been altered by information dynamics and knowledge economics. The rapid advances in computer technology and software design, especially in artificial intelligence, have shifted libraries to a "demand" economy. Unless libraries begin exploiting the technologies and innovate manage information and knowledge, they may face obsolescence in the 21st century.

INFORMATION, SOCIETY, AND LIBRARIES

Societal evolution is linked directly to the control of information: its usage, access and organization. Information records human perception in many forms -- music, equations, pictures, history, data. However, the written symbol and the invention of the printing press opened the demand-driven information industry.

Public libraries had an immediate impact upon society and information economics. They provided open dissemination of information for an insubstantial charge. But more importantly, libraries provided a structure for accessing knowledge.

In the 20th century, libraries have made use of electronic technologies to upgrade access to not only their own resources, but those of other institutions and information sources. They have broadened collections to include various media -- recordings, art, etc. By amplifying access and encouraging users to do their own searching, libraries created a "knowledge economy," an environment where finding a fact is not as important as being able to use it. The information explosion has given rise to a new need: knowledge management, a field few but the boldest libraries enter.

The age of the microprocessor has lead to the proliferation of intelligent machines, including the personal computer. Today, the personal computer allows users to customize what information is received and its presentation. Users can manipulate pictures, sounds or music, and textual information. Information access on a global scale is available at any time for a modest investment. With so much information available, users seek a means to manage it. Artificial intelligence is one discipline offering possible solutions.

ARTIFICIAL INTELLIGENCE, FACETS OF A NEW TECHNOLOGY

The term artificial intelligence often conjures images of robots and talking computers. Many speak of AI as if it were a specific technique. It is, however, a wide variety of techniques, programming styles, and devices.

To be true AI, the system must develop its own response to its environment. The first instance of artificial intelligence was an electronic mouse, complete with vacuum tubes, which learned to negotiate a maze. But the discipline has evolved since then.

There are many aspects of AI which focus on how computers can learn to interpret information. Much research concerns vision: character recognition, picture analysis, 3D perception, and modelling the function of the eye. Simi-

larly, there is speech recognition, speech production, use and understanding of natural language. The area given most attention has been expert systems.

Expert systems can provide reference assistance, aid in personnel policy decisions, assist in applying cataloging rules, determine vendor assignments, guide collection development, etc. To do such different tasks, expert systems use various approaches to imitate human reasoning and deal with uncertainty. Most require a "knowledge base," a set of rules culled from human expertise.

For the technical library, other areas of artificial intelligence offer more options: automatic cataloging/classification using character recognition, automatic translation of foreign language materials, automatic indexing/retrieval of audiovisuals, interactive bibliographic instruction using various media, intelligent gateways to online sources, user-structured information environments, portable computer reader services for the handicapped, intelligent document delivery, and the list goes on. These services are already under development in academic and industry circles. Technical libraries have an opportunity to participate.

Artificial intelligence promises a genie summoned forth by a few keystrokes. It can read to you, teach you, advise you, inform you, correct your mistakes, and suffer patiently your myriad demands. The computer offers everyone the benefit of expert advice and assistance tailored to their needs. Not surprisingly, it holds great potential for information management. An intelligent gateway to the library can provide sophisticated services 24 hours a day.

INFORMATION DYNAMICS, TECHNOLOGY, AND KNOWLEDGE ECONOMY

Information Dynamics

There are many libraries which persist in simply automating the 19th century library. To exploit the new technologies, libraries must be flexible to explore new strategies.

Traditional bibliographic access was necessarily artificial and sequential. Rigid physical descriptions, which are based on the book, and classification schemes -- reluctant to accommodate contemporary society -- have lead to rule interpretations and alternate hybrid schemes. While catalog access has a predictable arrangement, for large, specialized collections access points can be limited, increasing search time.

Computer scientists view the organization of information and knowledge differently. The AI specialist views information as a recorded perception -- visual, auditory, verbal, etc. Knowledge lies in the relationships between various perceptions (information). Information and knowledge are individual constructs which can be dynamic or static.

The behavior of AI systems is rapid and seemingly random at times. Importantly, the systems invite user interaction. But going beyond traditional access, it offers a hypermedia approach; music and pictures can be called up as readily as a catalog record bringing an added dimension of knowledge management.

The traditional packaging of information access is losing out to the packaging of knowledge. If libraries are to thrive in the new knowledge economy, they must re-examine their practices. Libraries have helped to spawn industries from which they draw no monetary gain. Today, corporations are marketing directly to the "knowledge consumer." Among their products are interactive CD systems, practical AI software, and online database services, marketing not to specialists alone, but the general public.

Personal computers can be connected to home video equipment, CD readers, scanners, and speech boards. You can buy a CD encyclopedia or reference book collections. The Next Corporation is pursuing CD books for their computer line. Microsoft will soon release a tablet which recognizes a person's handwriting. The general consumer sees various intelligent marketing tools advising him/her about products. The home computer can do budgets, taxes, and educate children. Now services like Prodigy can provide communications, games, information, and access to outside services as making plane reservations. Libraries are no longer the only "knowledge medium" for finding answers or information.

Economics of Information

The terms benefit, utility, fitness have a place in both the biological and economic world. If "Libraries are living organisms" as Raganathan stated, then we must concern ourselves with our survival. Can technical users get information without the library? In many cases, they can and more swiftly. A patron can e-mail a coworker worldwide for a fax of an article from the local library and receive it in the same or next day.

The library is no longer as efficient. Its provision of access and document delivery is largely outmoded in an immediate access world. Libraries often refer users directly to other information and knowledge vendors. For some libraries, it may be too late to escape their archival role. Many technical libraries, however, remain fit and competitive by taking an active role in the emerging "knowledge economy."

Should librarians worry? Many computer centers are eager to set up and run database services for their users which supersede or compete with the libraries' services. They currently don't have the librarian's expertise, but in time, they will. If libraries have not invested into the new knowledge technologies, they face a slow obsolescence. If they can realize a monetary gain from their investment, all the better. Most libraries generate few revenues to meet the demands of the new information economics.

The cost of innovation is smaller than the cost of maintenance: preserving the aging collection, purchasing new materials and equipment, and offsetting inflationary expenses. Every organization relying on an allocation for operation will find increased competition if it cannot generate its own revenue in part. Inevitably, libraries must exploit readily available technology and resources to stay viable and visible in the electronic world.

Steps for Surviving in the Knowledge Economy

To stem the tide, technical libraries must become "knowledge managers." The first step is to design innovation into the library's mission, committing resources for research, equipment, and training. Relations must be strengthened between information departments. The users are interested in dynamic information access and management services. The computer science departments, the campus computing center, MIS programs, etc. are sources of assistance, funding, innovation, and support (people, equipment, contacts). Those libraries which have developed such liaisons have been remarkably successful in integrating new technologies.

Information technologies and interlibrary projects are needed to enhance sharing of resource and increasing productivity. By arranging a protocol for document delivery, libraries can provide accelerated service and reduce strained collection budgets by building upon collectively determined strengths.

Libraries must look to outside collaboration with business, government, and other agencies. Too often, libraries create their own image of dependency,

relying on "inherent self-good" rather than pursuing revenue-generating alliances. The collection may have a set of documents which would support outside indexing/abstracting services. The library may be uniquely situated to serve as a technical information center.

Marketing should be a new perspective when developing in-house products, for example, microform or CD products based on unique holdings or collection strengths. The development of new knowledge packages using artificial intelligence is an open arena for exploration and marketing.

The above discussion is not to point to ailing library budgets but examine survival planning for the 21st century. If users have better access through a supplier on demand, why do they "need" the library? This is especially true for research groups whose grants help fund the library. Alternative funding sources are needed to relieve the demand/ allocation cycle.

CONCLUSION

Born of a societal need for information and its control, libraries accelerated the access to information. But while libraries continue to focus on access and organization, society looks for new means to manage information and knowledge. The impact of immediate access creates a need for information management and the electronic library.

New technologies make possible the packaging of knowledge, putting expertise or guidance at one's fingertips. If libraries remain reluctant to explore information management, they face competition with computer information centers which are beginning to see online data sources as their domain. While the cost of access will become stable, the cost of knowledge will rise. To shift the focus to information management, will require building new alliances and using new tools.

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